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PATENTS ACT 1953

COMPLETE SPECIFICATION

Title of Invention:

Packaging apparatus

Name, address and nationality of applicant(s) as in international application form:

MACHINERY DEVELOPMENTS LIMITED, of 8c Tagalad Road, Mission Bay, Auckland 1001, New Zealand. A New Zealand Company.

TITLE: PACKAGING APPARATUS

FIELD OF THE INVENTION

This invention relates to an apparatus for producing packages. It has particular but not necessarily exclusive application to the production of bag-like packages from a flat tube of plastics film fed off a roll of such film.

BACKGROUND OF THE INVENTION

Machines for producing such packages are well known. However, the conventional commercially available machines of this type known to the applicant were designed to produce packages of a predetermined length and, in a practical sense, were incapable of being readily adjusted to produce short runs of packages or even single packages of varying length.

Various means are employed in such commercially available machines to change the bag length. In a commonly known type of machine, exemplified in the specification of British patent #1137057, the drive rollers for advancing the tube stock are operated stop/start fashion by a crank mechanism. The throw of the crank can be varied to alter the length of bag produced by the drive rollers. This arrangement is quite unsuitable for quick changes of bag length.

In a commercially available type of plastic bag making machine the drive rollers are also operated stop/start fashion. They are digitally controlled to feed the tube stock a distance determined by punching a desired bag length into a numeric keypad on the machine. Such machines are designed to produce about 100/200 bags per minute so, in day to day operation, changing bag length between each bag or even after a run of few

bags would be out of the question.

Bag making machines which are installed at a workstation where goods are packaged at the same time as the bags are made or dispensed can be divided into three different classes:

a. machines which are intended for the high speed packaging of long runs of articles which are mutually identical or of liquids in mutually identical quantities. Examples of such machines are shown in US patents #3537225 (Fields), #4346546 (Tasker) and #3557526 (Hartmann).

b. the applicant is aware of a single patent, US #3161002 (Duns), showing a machine from which bags of varying length can be obtained.

c. machines for dispensing pre-made bags. A machine of thus type is disclosed in US patent #3908343. Such machines are not relevant to the present invention.

In the above mentioned patents, the only machine which is intended to produce bags whose length can be varied as each bag is made is shown in the Duns patent. In this machine the bag length is varied by the operator who manually draws off the required length of tube from the tube stock each time a bag is made. It will be clear to those skilled in the art that the remaining patents show machines which are quite unsuitable for quick changes of bag length. That they are all intended for producing long runs of bags of constant length is apparent from the descriptions of the length changing mechanism in each case in combination with the other parts of the machine and the product to be packaged.

In certain circumstances, producers of goods of variable length which require similar packaging would find such machines of substantial commercial benefit. Thus the present invention has particular but not exclusive application to the factory packaging of joints of meat and other articles of somewhat variable size.

SUMMARY OF THE INVENTION

According to the invention there is provided apparatus for the production of packaging elements of individually variable length from a stock of flexible laminar packaging material in the form of a tube which packaging elements are produced by feeding successive leading portions of the packaging material from the stock and separating such leading portions from the stock , the apparatus comprising feed means for feeding said leading portions from the stock and control means which can be set to cause the operation of the feed means to be interrupted after each leading portion has been fed to a predetermined location so that the timing of the production of each packaging element can be controlled by an operator, the apparatus comprising means for suspending each said leading portion in the predetermined location, where it is retained without being opened until it is removed, and length determining means capable of being adjusted by the operator to cause the feed means to vary the length of each said leading portion so that the length of each packaging element can be selected by the operator to suit the length of an article to be packaged therein.

In one form of the invention the apparatus comprises an operator actuated switch means arranged to connect the feed means to a power supply to cause the feed means to feed a said leading portion from the stock and to interrupt the power supply to the feed means after the feed means has fed each said leading portion from the stock.

The term "operator actuated" as used in this specification and in the claims envisages that the apparatus can be operated in a normal mode of operation to produce packages each of which can have a unique length. Further, that for this purpose the apparatus is provided with length determining means and switch means which must both be actuated by an operator each time a bag is to be produced. And, still further, that the operator may either be a human operator or a device (or combination of devices) which is set up to measure the lengths of each of the articles to be inserted in the packages and which is operably interconnected with the length determining means and the switch means to cause the apparatus to produce a package only when an article is detected and measured, the length of the package being determined by the length of that article.

In one example of the invention the feed means comprises at least one drive roller over which the packaging material from the stock passes, and means for coupling the drive roller to a motor.

In one example of the invention the length determining means comprises a counting

device operably connected to the motor and the control means is arranged to start the motor and to stop it after the counting device has counted a number of revolutions or fractions of revolutions performed by the motor or the drive roller, which number is determined by said information fed to the length determining means.

In an alternative example of the invention the length determining means comprises a timing device operably connected to the motor and the control means is arranged to start the motor and to stop it after a period of time counted by the timing device, which period is determined by said information fed to the length determining means.

According to one aspect of the invention the apparatus comprises means to immobilise the feed means when each said leading portion is in the predetermined location.

In one form of the invention the control means comprises detecting means arranged to detect the presence of each said leading portion when such leading portion is at the predetermined location and to immobilise the feed means when such leading portion is detected at the predetermined location.

It may be noted that it is not necessarily a function of the aforementioned detecting means to determine the length of the said leading portions. The detecting means can therefore be mounted in a substantially fixed position on the apparatus.

In one form of the invention the detecting means comprises a proximity sensor which is operably interconnected with a switch means which can be actuated by a signal provided by the sensor upon detecting the presence of a said leading portion at the predetermined location to immobilise the feed means.

In one aspect of the invention the detecting means comprises a proximity sensor which is operably interconnected with a switch means which can be actuated by a signal provided by the sensor upon detecting the removal of a said leading portion from the predetermined location to cause the feed means to feed a further said leading portion from the stock.

According to a useful aspect of the invention the length determining means includes at least on preselector means which upon actuation causes the feed means to feed a said leading portion of preselected length from the stock.

Another useful aspect of the invention provides that the length determining means

includes a keying device by means of which a human operator can key in numerical said information for determining the length of a said leading portion.

In one form of the invention the apparatus comprises cut-off means for separating each leading portion from the stock and sealing means located adjacent the cut-off means for sealing an end of said leading portion formed by the cut-off means. Preferably said leading portion is held suspended from said sealed end in the predetermined location.

Because the apparatus is intended to be operated so that the length of each packaging element can be selected to correspond to the length of the article to be packaged, it is an important feature of the invention that the information which corresponds to the intended length of said each leading portion can be fed to the length determining means before the switch means is actuated. In yet another aspect of the invention the control means is such that, while the apparatus is producing a said element, said information for determining the length of a following said leading portion can be fed to the length determining means.

The apparatus may be used for producing packaging elements from a stock of laminar packaging material in the form of a film or a tube. The tube may be either preformed or formed from a stock of film by the apparatus itself. Apparatus for forming film into a tube prior to cutting the tube into discrete lengths is known - see for example US patent # 3537225. In one form of the present invention in which the material is in the form of a tube, said apparatus comprises sealing means located adjacent the cut-off means for sealing a rear edge of each said leading portion of said tube.

The apparatus may also comprise a suction device arranged to apply suction to a first layer of a said leading portion of the tube, and means to separate a second layer thereof from the first layer.

The invention may be applied to package producing apparatus which scores or perforates the film or tube or otherwise creates a line of weakness across the film or tube instead of severing it so that the leading portions will preferentially separate from the stock along the lines of weakness. The term "separate" should be interpreted with due regard to the above whenever it is used in this specification and in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is further discussed with reference to the accompanying drawings in which

Figure 1 is a somewhat schematic partial side view of an apparatus for producing packages;

Figure 2 is a block diagram showing a schematic arrangement of some of the electronic controls of the apparatus shown in Figure 2; and

Figure 3 is a side view of the profile of a modified apparatus for producing packages.

DETAILED DESCRIPTION OF THE EMBODIMENTS SHOWN IN THE DRAWINGS

In Figure 1 there is shown a bag making machine comprising a cabinet 10 in which a spool 12 is rotatably mounted. An elongate flat tube (indicated by the chain dotted line 14) of plastics film is rolled onto the spool before the spool is mounted on the machine. The mounting is such that the tube 14 can be drawn off the spool and fed to a bag making apparatus 20 which is described below. A braking device (not shown) may be provided which prevents the spool from turning unless tension is applied to the tube. The tube will not therefore be fed off the spool unless it is drawn off by the bag making apparatus. Mechanisms for mounting and braking the spool in this way are well known and need not be described here.

The bag making apparatus 20 comprises a first belt assembly 22, a heat sealing and cut-off device 24 and a second belt assembly 26. For convenience the heat sealing and cut-off device will be referred to simply as the "cut-off device". As indicated in the drawing, the tube 14 is held in a flat plane as it passes through the apparatus 20. This plane however is inclined at an angle of about 20 degrees to the horizontal when the machine is in the attitude shown in the drawings. The tube is thus moving upwardly as it emerges from an opening 17 in the cabinet. The reason for this is explained below.

An electric motor 28 is mounted in the cabinet and, through an in-line helical gearbox (not shown) and sprocket chains (indicated by the dotted lines 30), drives both of the

belt assemblies.

The first belt assembly 22 comprises a pair of large diameter rollers 32, 34 and a pair of small diameter rollers 36, 38. The large diameter rollers are located one over the other as are the small diameter rollers. All rollers are mounted with their rotational axes parallel. The lower one of the large diameter rollers in each pair is driven by a sprocket chain 30. The upper one the large diameter rollers in each pair is driven by the lower roller through a pair of spur gears (not shown) of equal diameter fixed concentrically on the ends of the rollers. The rollers thus rotate at the same speed but in opposite directions.

A set of endless resilient belts or bands 40, axially spaced apart along the rollers, is passed around the upper pair of rollers 32, 36. Similarly a second set of belts or bands 42 is passed around the lower pair of rollers 34, 38. The bands are located in grooves in the rollers and stand proud of the circumference of the rollers. The rollers are positioned so that the lower bights of the upper set of bands 40 are located adjacent the upper bights of the lower set of bands 42. The lower bights in the upper set of bands are driven in the same direction and at the same linear speed as the upper bights in the lower set of bands. These bights are closely spaced so that they will grip a tube 14 introduced therebetween and feed it towards the cut-off device 24.

The construction of the second belt assembly 26 is very similar to that of the first belt assembly 22 so that the assembly 26 will not be described in detail. It will however be noted that, in both assemblies, it is the small diameter rollers which are located adjacent the cut-off device 24. Because the assembly 26 is arranged to draw the tube 14 through device 24 and feed it through the opening 17 in the cabinet, the small diameter rollers in the assembly 26 are located further apart than the large diameter rollers 32', 34'. This is to facilitate entry of the leading edge of the tube between the bands of the assembly 26.

It may be advantageous to mount the upper large diameter roller 32' on a slide rail so that it can slide towards and away from the lower roller 34' under the action of a pneumatic ram. This ram may conveniently be located above the roller 32'. Actuation of the ram would cause the roller 32' to apply variable pressure to the roller 34'. A reduced pressure would enable a finished bag to be withdrawn by hand from the belt assembly 26 when the machine is operated in this mode. Increasing the pressure would

increase the frictional grip of the bands on the bag and prevent such withdrawal. This latter is a useful feature when the machine is operated in a mode in which it produces bags uninterruptedly as discussed further on.

Incidentally, to prevent the tube from bunching up in the cut-off device 24 or between the two belt assemblies, the assembly 26 is driven a little (i.e. about 10%) faster than the assembly 22 so that that part of the tube between the two belt assemblies is held in tension. However the grip of the second belt assembly 26 on the tube is less than that of the first belt assembly. The reason for this is that after a bag is made, it must be possible to withdraw it from the belt assembly 26 by hand while the assembly 26 remains stationary. Thus while some slippage must be allowed for in the second belt assembly 26, any such slippage is undesirable in the first belt assembly 22.

Between the two belt assemblies, the tube 14 passes directly over an aluminium plate 50 forming part of the cut-off device 24. Devices of this kind are known. A suitable such device is, for example, described in detail in the applicant's international patent application #PCT/EP92/01624. The device 24 will thus will not be described in detail here. However, its function will be briefly described. When a predetermined length of the tube 14 has been advanced through the device 24, the belt assemblies (and thus the tube) are stopped and a head 52 is brought down against the plate 50. At this time a blade mounted on the head cuts off the portion of the tube which has been advanced through the device 24 and a heating bar heat seals the said portion along the edge which has just been cut. The said portion is thus formed into a bag the front end of which projects through the opening 17 of the cabinet.

It is desirable to provide one or more anti-static bars to prevent the tube 14 sticking to the parts of the machine with which it comes into contact. Two such anti-static bars are shown at 58.

Referring now in particular to Figure 2, in the following discussion, unless otherwise stated, the electronic components and circuitry which are described for controlling the machine are either commercially available or could be designed by those skilled in the art without substantial difficulty. It is therefore not considered necessary to describe such components or circuitry in detail.

In the first place a sensor 56 is located just above the exit to the device 24. While provision may be made for adjusting the position of the sensor from time to time this should not normally be necessary in the ordinary operation of the apparatus. In a practical sense the sensor may thus be regarded as being mounted in a fixed position. The sensor 56 detects the presence of a leading portion of the tube 14 which has made into a bag and has been fed out of the device 24. When the bag is removed from the roller assembly 26 and is thus no longer detected by the sensor 56, the sensor causes a switch S1 to be closed and thereby readies the machine to produce the next bag. In one mode of operation of the machine the next bag will be produced when a switch S2 is actuated by the (human) operator. In another mode of operation of the machine the switch S2 is by-passed by switch S3 when switch S3 is closed. In this latter mode the next bag is thus produced by the act of removal of the first bag from the assembly 26. In this mode the sensor functions as the switch which is closed by the act of the human operator in removing the bag. The circuit also includes a switch S4 which, when closed, bypasses the switch S1 and thus (if the switch S3 is also closed) causes the machine to produce bags uninterruptedly until it is stopped. For yet another mode of operation the circuit includes a switch S5 which, through a timing device actuated by the sensor, interrupts the power supply to the motor if no tube is detected within a preset short period after a bag has been removed from the belt assembly 26. This is to prevent the tube being fed off the spool if it is not advancing through the device 24 or if bags become jammed in one or other of the roller assemblies 22, 26.

The sensor 56 can be a light activated electronic proximity sensor but this is not essential. A suitable sensor is the SICK OPTEX VT180, produced in Japan.

A second sensor can be located between the assembly 26 and the cut-off mechanism 24. This second sensor detects the presence (or absence) of the tube 14 before it enters the cut-off mechanism and thus provides an indication that there is no more stock on the spool 12.

In the present example, the length of the bag which is produced is determined by an electronic counting circuit which counts the revolutions (or fractions of revolutions) of the electric motor 28 which drives the belt assemblies and causes the motor to be stopped after a number of such revolutions or fractions of revolutions (which can be varied as required) have been counted. For this purpose the electronic counting circuit

includes a programmable logic controlled (PLC) device A which incorporates a timer and is mounted in the cabinet. The counting circuit includes relays R which control the supply of power to the motor, the cutting device and the heat sealing device. In the present case the counting circuit includes a control device C mounted on the face plate 60 of the cabinet and having a knob 62 which is turned to alter the setting of the circuit. A suitable PLC device is commercially available from the Mitsubishi company of Japan, catalogue number Melsec FI-20-MR-ES. The knob has a pointer which registers with a scale graduated to read out the bag length conforming to the setting of the knob.

An alternative, commercially available, PLC device is available from the Festo company of Germany, catalogue #FESTO-FPC-202.

The machine shown in Figure 1 may also be provided with one or more preselector or default switches (one being indicated at S6 in Figure 2), actuation of which automatically causes the machine to produce a package of preset constant length, irrespective of the setting of the control knob 62.

Other controls and indicators are located on the face plate 60. The indicators include:

(a) a light which shows that a bag has been formed and is ready for removal;

(b) a light showing that the machine is switched on; and

(c) a light that shows that the machine is not in a safe condition to operate. Typically, this might arise if one or other of the covers or doors of the machine are not closed. It is desirable that door- and cover-operated switches immobilise the machine when they are not closed.

The controls may alternatively or in addition include a switch to switch the machine between two modes of operation in the first of which a bag is made in response to detection by a sensor of a mark on the tube. Since the marks on the tube will normally be evenly spaced apart, bags of uniform length will be made in this mode. In the second mode the sensor is inoperative so that the bag length will be determined by the other means mentioned above.

In a variant of the above the marks could be spaced closely and the sensor could be integrated with an electronic counter. A bag would thus be made only after a programmed number of marks has parsed the sensor.

In another variant, instead of counting the revolutions of the motor, the timer could be arranged to supply power to the motor for a time interval which can be readily varied by the operator. Alternatively the controls, in addition to the timer, could include a rheostat or some other device to enable the operator to readily vary the power supplied to the motor (and hence the speed thereof) for a fixed time interval. Either of these arrangements would result the production of bags of readily variable length. Both the timer and the power control device could be set by means of control knobs calibrated against scales corresponding to the required length of a bag.

The drive roller assemblies 22, 26 could be replaced by a mechanism comprising a carriage having gripping devices which grip the end of the tube (or monolayer film) and draw it off the spool 14 and through the cut-off device 24. The controls would then be programmable to draw off varying lengths of the tube or film. In a variant of this the gripping devices would be mounted on a fixed support and the cut-off device 24 would be mounted on guides so as to movable in relation to the support. The controls would be programmable to vary the distance through which the cut-off device is moved from the support.

In yet another variant the control knob and related circuitry could in each case could be replaced by a keyboard and numerical display may be mounted on the face plate and integrated with suitable circuitry. The length of the bag required would then be entered as numerical information on the keyboard. For the purposes of this variant, the reference numeral 62 in Figure 1 should be taken as indicating such a keypad. A suitable keyboard device with digital display which can be used in conjunction with the aforementioned PLC device from the Mitsubishi company is commercially available, also from the Mitsubishi company, catalogue number F-20-DU_2-E-SET. Similarly, a keypad suitable for the aforementioned PLC device from Festo is available from FESTO under catalogue number E.ABG

It will be clear to the skilled addressee that the usefulness of all of the machines described herein and illustrated in the drawings is dependent on the ability of the

machines to produce bags so quickly as not materially to slow down the output of the operator. The rate of bag production can vary according to what the machine is designed to be used for. In conventional meat packaging operations, for example, a human operator of average capabilities, is capable of packaging, in sustained way, up to about 15 cuts per minute. All of the machines illustrated in the drawings are able to produce a bag in about 4 seconds. It might be supposed that the time taken to adjust the machine for producing a different bag length would reduce the rate of production of bags but this need not be so. The reason for this is that in the case of a machine constructed and electronically controlled as described herein in which the length adjustment is carried out by turning a knob or punching a key pad, the number or equivalent information which sets the length of the following bag can be inserted in the apparatus by the operator while a first bag is still being produced. The number is retained in the electronic memory of the apparatus.

Bag length adjustment when a preselector switch S6 is used is substantially instantaneous.

Therefore in practice the adjustment step need have no substantial effect on the rate of production of bags.

Even in the case in which a human operator punches the keypad or turn the knob 60 and then closes a switch to initiate the production of a bag, the time taken to carry out this operation is negligible compared to the time (which is certainly of the order of five minutes at the least) taken to adjust the bag length and restart the conventional machines discussed in the introduction to this specification or which are presently commercially available for the production of longs runs of bags.

One of the advantages of the machine shown in Figure 1 is that it is compact and can be mounted overhead so that it takes up less floor space in a packaging plant. In this case the machine is mounted with the face 70 of the cabinet horizontally disposed and facing downwards. The bags are thus fed downwardly out of the opening 17. It is in this application that the aforementioned inclination of the bag making mechanism 20 is important. If the mechanism was not inclined the leading edge of the tube 14 between the belt assembly 22 and the cutter of the mechanism 24 would tend to hang freely with an increased likelihood of being out of alignment as it approached the belt assembly 26.

When the apparatus 20 is inclined the tube remains in contact with the plate 50 and is accurately guided towards the belt assembly 26.

The cabinet of the machine shown in Figure 1 can be modified as illustrated in Figure 3, wherein the cabinet 300 has a cut out portion 302. This accommodates a conveyor indicated schematically at 304 which is positioned at the operators' waist height. The bag making apparatus 20 is mounted in the part of the cabinet above the cut out portion and the spool 12 is mounted in the cabinet below the cut out portion. The cabinet 300 takes up very little floor space and is very useful for locating in existing packaging plants where space is limited. The cabinet may be mounted on rollers or castors which is more convenient than mounting an entire apparatus overhead as suggested in the previous paragraph.

The provision of electronic controls also enables the machine to be used in conjunction with a conveying apparatus which brings articles of varying length to the bag making machine for packaging. The conveying apparatus can be provided with a transducer of known kind such as a LVDT (linear variable displacement transducer) or an optical no-touch image analyser which electronically determines the length of each article and thereupon sends electronic information to the controls of the bag making machine to cause it automatically to produce a bag of the correct length suitable for each article as it arrives at the bag making machine. An arrangement which includes such a transducer set up to determine the length of each bag is to be regarded as an 'operator' for the purposes of this specification and the claims.

The bag length can also be determined by a human operator who is located at a work station remote from the station where the machine is located.

When the machine is placed overhead it is convenient to provide a control box on the end of a cable which hangs down from the machine and which incorporates a key pad or control knob.

The nature of the plastics film may vary. The machine described is, for example, suitable for heat sealable material and vacuum packing material. The apparatus is suitable for packaging meat in shrink-type packaging.

A printing device may be mounted at a suitable location such as between the spindle assembly 12 and the drive roller assembly 22. Suitable printing devices are known per se, one such being sold under the name DATO/PACK™ marketed by Image Jet Printing Pte Ltd of Singapore. Another feature which may be provided is a counting device to count the number of bags produced by the apparatus and/or the length of tubular film used from each roll. Counting devices of this kind are also known per se.

The belts may be of rectilinear, round or oval cross-section.

The apparatus can be used to form a package which is open at both ends. In this case the heat sealing mechanism can be inactivated or dispensed with. It may also be used to produce discrete single sheets of packaging material from a roll of monolayer film.

The apparatus may be provided with an air blast or other bag opening mechanism as illustrated in the applicant's aforementioned application #PCT/EP92/01624.

It is not intended that the scope of a patent granted in pursuance of the application of which this specification forms a part should exclude modifications and/or improvements to the embodiments described and/or illustrated which are within the scope of the invention as defined in the claims or be limited by details of such embodiments further than is necessary to distinguish the invention from the prior art.

WHAT I / WE CLAIM IS

1.

Apparatus for the production of packaging elements of individually variable length from a stock of flexible laminar packaging material in the form of a tube which packaging elements are produced by feeding successive leading portions of the packaging material from the stock and separating such leading portions from the stock, the apparatus comprising feed means for feeding said leading portions from the stock and control means which can be set to cause the operation of the feed means to be interrupted after each leading portion has been fed to a predetermined location so that the timing of the production of each packaging element can be controlled by an operator, the apparatus comprising means for suspending each said leading portion in the predetermined location, where it is retained without being opened until it is removed, and length determining means capable of being adjusted by the operator to cause the feed means to vary the length of each said leading portion so that the length of each packaging element can be selected by the operator to suit the length of an article to be packaged therein.

2.

Apparatus according to claim 1, comprising an operator actuated switch means arranged to connect the feed means to a power supply to cause the feed means to feed a said leading portion from the stock and to interrupt the power supply to the feed means after the feed means has fed each said leading portion from the stock.

3.

Apparatus according to claim 1, comprising means to immobilise the feed means when each said leading portion is in the predetermined location.

4.

Apparatus according to claim 1, in which the control means comprising detecting means arranged to detect the presence of each said leading portion when such leading portion is at the predetermined location and to immobilise the feed means when such leading portion is detected at the predetermined location.

5.

Apparatus according to claim 4, in which the detecting means comprises a proximity sensor which is operably interconnected with a switch means which can be actuated by

a signal provided by the sensor upon detecting the presence of a said leading portion at the predetermined location to immobilise the feed means.

6.
Apparatus according to claim 4, in which the detecting means comprises a proximity sensor which is operably interconnected with a switch means which can be actuated by a signal provided by the sensor upon detecting the removal of a said leading portion from the predetermined location to cause the feed means to feed a further said leading portion from the stock.

7.
Apparatus according to any one of claims 1 to 6, in which the length determining means includes at least one preselector means which upon actuation causes the feed means to feed a said leading portion of preselected length from the stock.

8.
Apparatus according to any one of claims 1 to 6, in which the length determining means includes a keying device by means of which an operator can key in numerical information for determining the length of a said leading portion.

9.
Apparatus according to any one of claim 1 to 8, comprising cut-off means for separating each leading portion from the stock and sealing means located adjacent the cut-off means for sealing an end of said leading portion formed by the cut-off means.

10.
Apparatus according to claim 9, in which said leading portion is held suspended from said sealed end in the predetermined location.

11.
Apparatus according to any one of claims 1 to 10, in which the length determining means comprises an electronic processor capable of receiving and storing information when the feed means is immobilised and which information is used by the electronic processor to determine the length of a said leading portion which is fed by the feed means from the stock after the feed means is restarted.

12.
Apparatus according to any one of claims 1 to 11, in which the length determining means is capable of adjustment by the operator in not more than four seconds to cause the feed means to vary the length of a said leading portion.

13.
Apparatus according to any one of claims 1 to 11, in which the length determining means is capable of substantially instantaneous adjustment by the operator to cause the feed means to vary the length of a said leading portion.

14.
Apparatus for the production of packaging elements, substantially as herein described with reference Figures 1-2 or Figure 3 of the accompanying drawings.

James W Piper & Co
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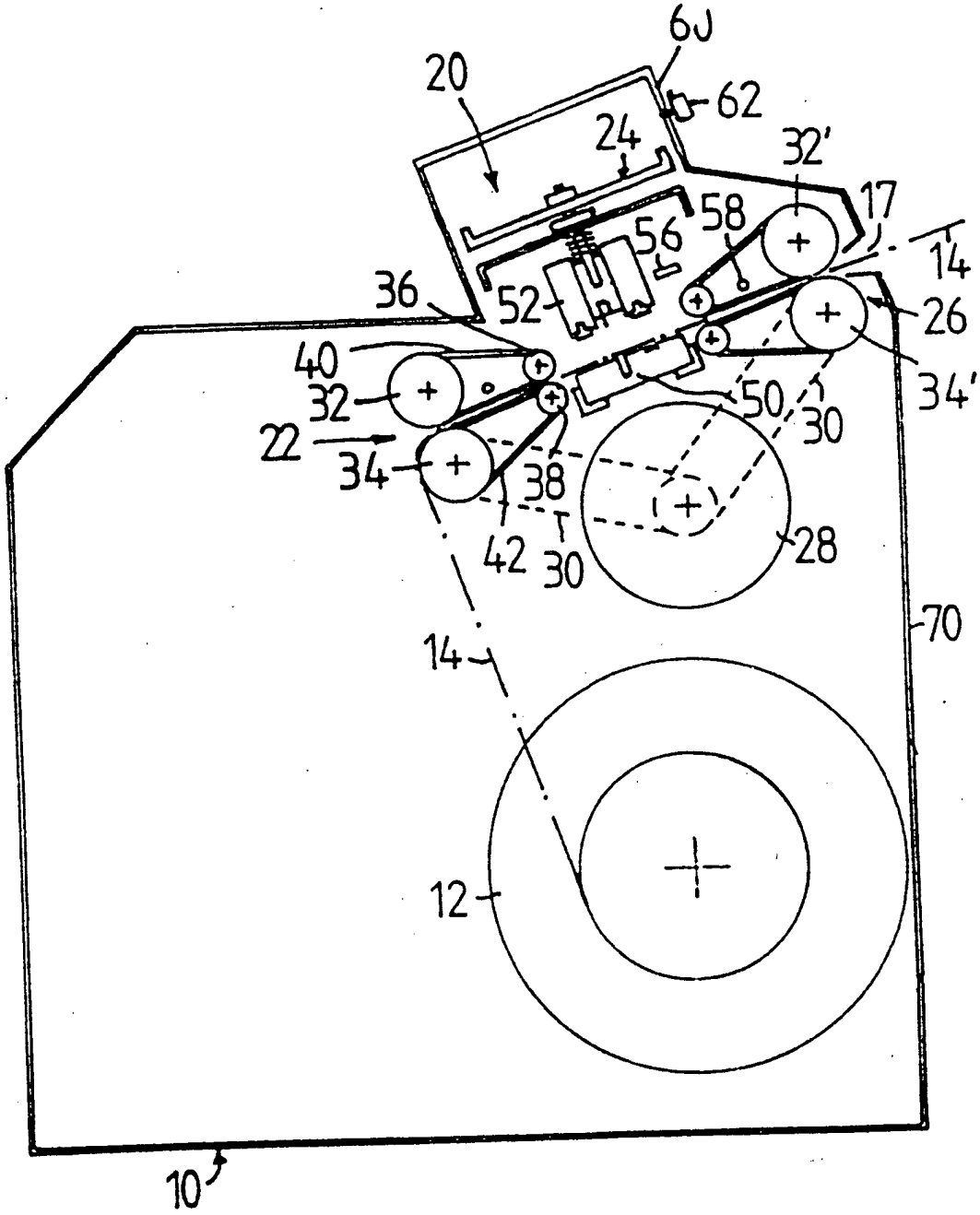
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FIG. 1

FIG. 2

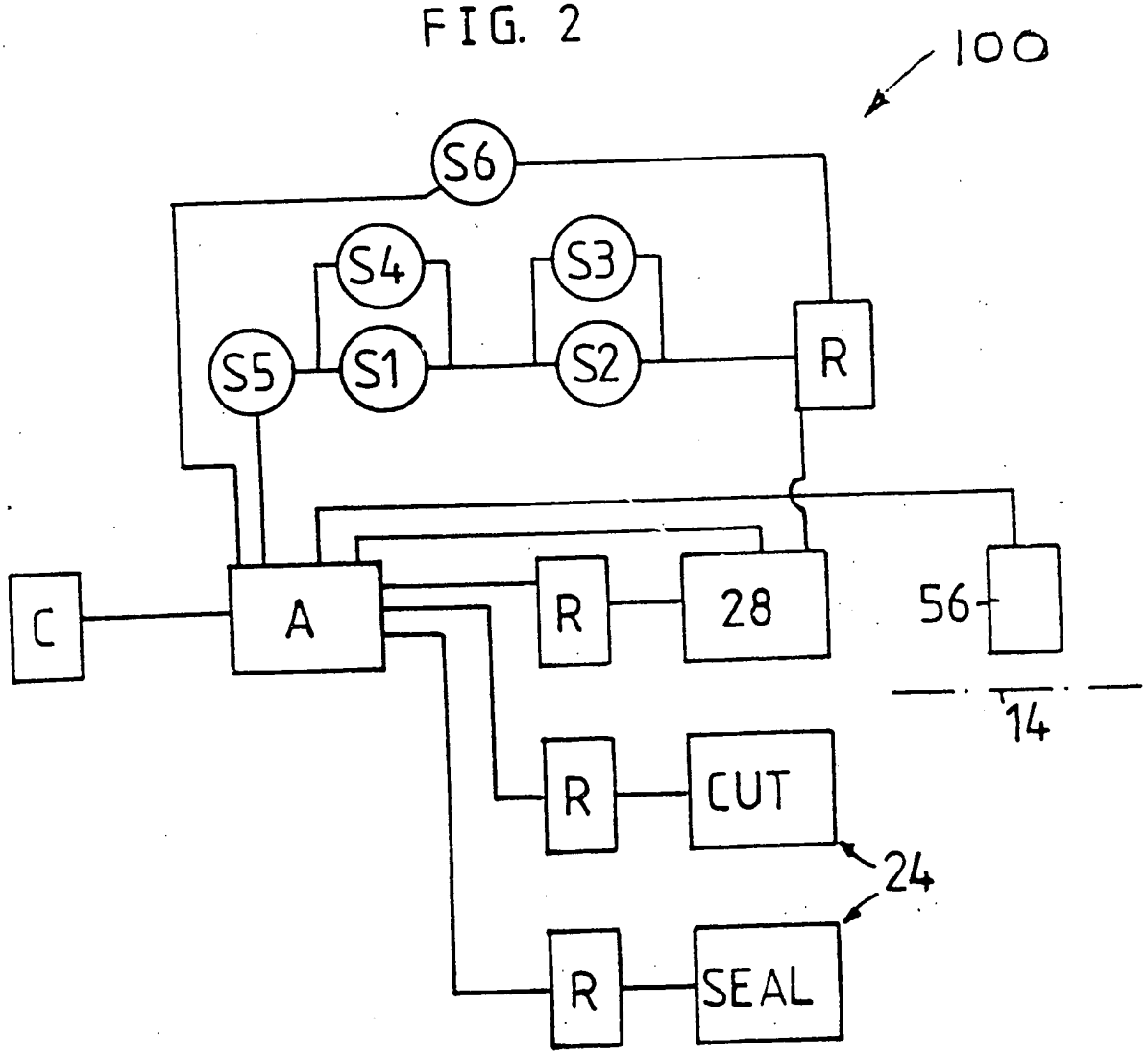

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FIG. 3